The Canadian Entomologist

LXIII ORILLIA, OCTOBER, 1931 No. 10

THE REACTIONS OF SOME INSECTS TO RAIN

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In a region where heavy rains constitute an element of the climate, it is imperative that all creatures meet these exigences with protective responses. The responses of many insects to rain are very interesting. Naturally their activities are usually favored by fair weather and sunshine. During rains many insects withdraw to protected places and await the return of sunshine to begin their activities.

During the summertime, when sudden and violent storms are characteristic of the weather many diurnal insects, such as the bees and butterflies may be suddenly overtaken in their rambles afield, and must quickly adjust themselves to meet these unfavorable conditions. To study their reactions it is not necessary to wait for storms, however, for with a hose and sprinkler, one can create artificial showers and downpours and bring about the typical rain response almost at once.

There is one condition of the artificial shower, however, that is not a normal feature of a genuine storm. The oncoming storm is usually attended by a canopy of heavy cloud so dense oftentimes as to cause a very marked reduction in the daylight intensity. This forerunner of the storm in some instances likewise appears to prepare the insects for the actual rain, the responses simulating these following the oncoming of evening.

Where artificial rain is created, the creatures are overtaken in the full sunshine, and the rain continues to fall with little appreciable change in the intensities of sunshine experienced by the insects. In spite of these abnormal conditions, most insects quickly adopt the characteristic rain response, and await the return to the rainless condition.

Honey bees, various species of butterflies and some of the nocturnal katydids have been tested with mere sprinkler and likewise with heavy downpours from the garden hose.

During the past summer, honey bees visiting the great spreading panicles of the Hercules Club, *Aralia spinosa* L. were suddenly subjected to gentle sprinkles from a hose sprinkler. At the first appearance of the drops the bees usually became disconcerted, ceased their nectar and pollen gathering, and made preparations for the rain. If the artificial shower was not too heavy many of the bees left the flowers, evidently to fly homeward. If the drops were made to fall in a heavy precipitate shower, the bees ceased their movements and remained clinging quietly to the flower clusters among which they were working. When the artificial shower was discontinued, it was not long until the wet and bedraggled bees began to move about in the warm, drying sunshine and their normal economies were soon resumed.

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The reactions of butterflies as they drift from flower to flower are particularly sharp and striking. A number of species have been subjected to sudden showers, including *Pieris rapae* Linn., *Colias philodice* Godart, *Basilarchia astyanax*, Fab., and a species of *Argynnis, cybele* or *aphrodite*. Several smaller dusky butterflies were also studied but were not specifically identified.

In some instances the insect at once takes refuge in the foliage of a nearby plant, clinging with its tightly closed wings to the underside of a leaf or stem. When the creature has once reacted definitely in this way, heavy streams of water may be directed upon it with such force as sometimes to wash the insect from its leaf. In spite of this violent deluge the butterfly will fight bravely to cling to the herbage and shelter itself as much as possible among the overhanging leafage. It would appear as if the insect simply regarded the sudden downpour as a particularly heavy storm, for it shows no pronounced fear such as it evinces at the approach of a hand. Let it perceive any movement of one's own person near at hand, and the typical fear reaction is at once expressed in sudden flight.

In some instances the butterfly displays the typical fear reaction when the first sprinkling drops fall upon it. This is evinced by a sudden and precipitate flight sometimes away from the artificial shower, at other times by a quick vertical ascent as if to get above the rain. If it continues to encounter the falling drops, however, it may drop quickly among the plants again, and seek refuge in the foliage of some plant with the typical rain response.

The butterfly, driven to shelter in this manner by the rain, will usually remain quiet for some time after the shower has been discontinued. Ultimately however, it will suddenly expand its wings which have very efficiently shed the rain, and take flight again. The hot sunshine appears to be the dominant stimulus bringing about prompt activity once more, for in cloudy weather there appears to be greater reluctance to begin their aerial wanderings following a wetting.

So prompt are the rain responses of some butterflies that I have sent the same individual to cover half a dozen times in the course of an hour.

SOME NEW NORTH AMERICAN GENERA AND SPECIES IN THE GROUP FORMERLY CALLED PLATYMETOPIUS (RHYNCHOTA, HOMOPTERA)

BY E. D. BALL,
University of Arizona, Tucson

(continued from page 222)

Nasutoideus celtidis n. sp.

Resembling *calliandrus* in size and form but light with vertex slightly acute and twice banded with ivory. Length 4 mm.

Vertex slightly acute but shorter, broader than in *loricatus* with a rounding apex, only slightly exceeding the pronotum in length. Color: grey much lighter than in *calliandrus* with the appearance of three or four transverse light bands, the first of which, half way between the eyes and apex of vertex, is made up of an ivory semi-circle around a dot on the margin, on either side and two pairs of dashes between these: the second is on the basal third of vertex; the third across the scutellum and sometimes a narrow one on the disk of pronotum.

The elytra are placed with sparse dark vermiculations giving a grey cast, with dark markings on the apical and costal veins and along the margins. Face creamy, irregularly irrorate with fine fuscous points.

Holotype— ♀, and *allotype*, ♂, July 24, 1920 and eight paratypes all from Tucson, Arizona, taken by the author in April and again in June and July.

Nasutoideus dodonanus n. sp.

Resembling *latus* in the fulvous color but smaller. Form and color of the female of *andromus* but with definite transverse markings on vertex and a white face. Length 4 to 4.5 mm.

Vertex definitely but only slightly acutely angled, about as in *frontalis*. The transverse light band broad, made up of four long ivory dashes each narrowly dark margined, this band is curved and margined broadly with smoky or brown. The base and apex of vertex pale, the latter with an ivory line, rest of dorsum washed with uniform pale brownish fulvous with very definite darkening on apical and costal veinlets. Face creamy white; below fulvous.

Holotype— ♀, *allotype*— ♂, and two pairs of paratypes taken June 28, 1930 and four females taken in April and September 1929, all taken at Tucson, Arizona, by the writer. The fulvous color and white face will readily separate this species from any other in the group.

Nasutoideus xanthanus n. sp.

Size and form of *nasutus* nearly but with a shorter vertex and pale fulvous cast. Length 4-4.5 mm.

Vertex slightly longer than pronotum almost parallel margined from base to just before apex where it forms a slightly acute angle. Transverse band made up of four or six rather long, narrow, slightly curved, ivory lines. Very narrowly dark-lined on a brownish fulvous field. A short line on apex and a pair against the suture at base. Pronotum faintly mottled. Elytra sparsely vermiculate and slightly mottled wth fulvous. The oblique veinlets darker. Face pale slightly washed with fulvous.

Holotype— ♀, and *allotype*— ♂, May 10, 1929, Tucson, Arizona. A pair of paratypes, August 31, 1929, Tucson, and four from Superior Junction, Arizona, July 30, 1929, all taken by the writer. This is a very distinct species in its size color and vertex pattern.

Nasutoideus desertanus n. sp.

Form and structure of *celtidis* nearly but much smaller and paler. Smaller and paler than *cinereus*. Ivory white with sparse reticulations and a broad dark band across the apical cells. Length 3.5 mm.

Vertex slightly longer than pronotum definitely but slighty acutely angled, longer than in *celtidis*. A small black tip with the usual ivory wedge, transverse band made up of six broad ivory lines separated by narrow dark ones. Often the outer dark lines disappear leaving only three in the middle and occasionally the band is solid ivory. Behind this band are irregular dark markings sometimes forming a band. The base of vertex light with fine dark lines. Pronotum and scutellum sparsely irrorate with fulvous occasionally a few dark aggregates on former and two brown spots behind the outer angles of the latter. Elytra very sparsely inscribed on the disk, without markings along costa except for the six to eight dark reflexed veinlets, apical cells to a

line just beyond the base heavily irrorate with fulvous. The extreme margin ivory white. Face creamy with more or less of fulvous. The extreme margin of lines. Below pale.

Holotype— ♀, and allotype ♂, Tucson, Arizona, May 5, 1929. Ten paratypes from same place April to August, 1929. All taken by the writer.

Nasutoideus heldoranus n. sp.

Resembling *desertanus* but stouter. Grey with a round shining black spot on apex of vertex. Length 3.5 mm.

Vertex slightly but definitely acutely angled. Slightly longer than pronotum. Color: vertex ivory, a round, shining black spot on apical third omitting the tip. The median suture and two narrow lines paralleling it and extending to base black. Outside these two more pairs of broken or dotted and slightly curved lines. These black lines set off the six ivory lines that ordinarily make up the transverse band but which in this case extend to the base. Pronotum with the anterior margin creamy The anterior portion irrorate while the posterior submargin is pale. Scutellum creamy. Elytra ivory very sparsely inscribed with fulvous, a dark spot on apex of clavus, the apical and reflexed costal veinlets dark, a faint cloud in the apex of the third apical cell and the appendix narrowly white. Face creamy sometimes slightly washed with rusty brown.

Holotype— ♀, *allotype*— ♂ and five pairs of paratypes taken at Tombstone, Arizona, June 15, 1930, by the writer. A strikingly distinct little species which can be recognized by the big black spot on the white vertex.

Nasutoideus irroratus var. **nogalinus** n. var.

Form and color of *irroratus* nearly but with a shorter, broader vertex, a transverse band and uniform colored elytra. Length 4 mm.

Vertex broad, right angled with much less than half of its length before the eyes, while in *irroratus* it is narrower and definitely acute with half or more of the length before the eyes. Color: vertex brown with a transverse band made up of an ivory semi-circle against the dark dot on either side and two pair of short ivory dashes inside these. The inner two often obscure. The posterior margin of the band forming a line just in front of the eyes. In *irroratus* the vertex is much darker, the transverse band is in the form of a semi-circle, which is still far in advance of the eyes. Elytra almost uniform brownish cinereous throughout while in *irroratus* there is a pale lobate commissural line and heavy dark margins on the reflex veinlets and in the apical cells. Face heavily irrorate with brown.

Holotype ♀, and allotype ♂, Santa Rita Mountains, Arizona, June 22, 1930, and four pairs of paratypes taken in the mountains around Tucson in May and June, 1929. All collected by the writer. This is probably a distinct species, but until food plants are determined and a larger series studied, it may be considered a variety.

Platymoideus graneticus n. sp.

Resembling *dubius* and *latus* but with definite white markings on vertex and a white scutellum. Length 5 mm.

Vertex long and acute. One-half longer than pronotum, two and one-half times as long as against eyes. The apex a trifle rounding with a slight constriction

at the apical third. Color: tawny fulvous, the vertex sparsely vermiculate with fulvous, omitting a definite ivory median line on apical third, and a marginal line that broadens and curves inward on either side of the constriction then continues to the eyes as a narrow line on the margin. A pair of ivory lines arising just back of and inside of the constriction and extending almost to a base, a narrow and less definite pair just inside them. Scutellum, all but the basal angles, creamy white. Elytra tawny with concolorous nervures, except outer apical and costal which are lightly fuscous. Apical cells smoky. Face pale yellow below the shark's mouth.

Holotype—♀ and 11 paratype females Granite Dells, Arizona, July 17, 1929.

Allotype—♂, Williams, Arizona, August 15, 1929 ,all taken by the writer.

This definitely and constantly marked species has no doubt been confused with *latus* and *dubius* in the past, *latus* has no markings on its acute vertex and the median line is trough-like, *dubius* may have obscure markings on vertex but lacks the light line and is more heavily irrorate on the elytra.

Platymoideus guterranus n. sp.

Resembling *acutus* but much smaller and lacking most of the fulvous or brown tinges, and the darker shade at the apex of the elytra. Length 4-4.5 mm.

Vertex long, acute in the female where it is twice as long as wide and half longer than pronotum. Male shorter but still acutely angled. Color; either mottled smoky brown or almost uniform rusty cinereous. Central portion of face creamy. Vertex with numerous very fine ivory lineations and larger ivory markings as follows; a median line broadest at apex and becoming obsolete posteriorly and a pair of slightly oblique lines arising near middle of lateral margins and slightly converging to divide base into equal thirds. These lines often expand at the base and are obsolete or irregular in an area just before this. Pronotum in the dark forms show five pale lines and the scutellum two. In both forms the vermiculations on elytra are coarse and irregular omitting larger ivory areas of which three pairs along the suture are the most definite.

Holotype—♀, *allotype*—♂, and five pairs of paratype, Yarnell Heights, Arizona, October 8, 1929. Four pairs of paratypes of the light rusty form from the same place July 21, 1929. All taken by the writer.

Platymoideus oviedus n. sp.

Resembling *cinereus* but smaller, narrower with a more sharply angled vertex. Length 3-3.7 mm.

Vertex in female over twice as long on the middle as against eyes nearly half longer than pronotum. The base very narrow, definitely less than a half the length. Male vertex shorter and broader about as in the *cinereus* female. Color; males cinereous, female paler with a slight fulvous cast. Vertex pale, finely vermiculate with fulvous omitting an ivory median line on anterior third. A pair of oblique lines arising midway between apex and eyes and reaching the base against the median line. Pronotum and scutellum very sparsely dotted, the latter pale. Elytra very sparsely dotted and the veins concolorous to the apical and costal cells where the veinlets are abruptly broadly darkened and the apical cells heavily irrorate with fuscous. Face pale, creamy below the shark's mouth, fuscous dotted above.

Holotype— ♀, *allotype*— ♂, and three pair of paratypes, Sanford, Florida, July 22, 1926, taken by the writer. This is the smallest species known, the smaller size, acute vertex and lack of orange on the scutellum will readily separate it from *cinereus*.

Convelinus analis var. **castranus** n. var.

Form and structure of *analis* nearly but much darker with three definite ivory white areas on dorsum, length 3.5 to 4 mm.

Vertex broad about right-angled, about equalling the pronotum, heavily and regularly inscribed with dark vermiculations, more or less linear, except for an ivory point at apex, a short slightly oblique ivory dash either side nearer the apex than the ocellus and an irregular light area at base. Pronotum heavily and irregularly inscribed with traces of three narrow light stripes. Scutellum creamy with irrorate areas inside the basal angles and before the ivory apex. Elytra heavily and irregularly inscribed, omitting a light area bordering scutellum, another well before and a third beyond. The dark apices of the claval areas. Face creamy, lightly dotted in the female, heavily in the male with dark.

Holotype— ♀, June 21, 1930, Tucson, Arizona.

Allotype— ♂, Tucson, May 10, 1930, and four paratypes with them.

The pale *analis* form from Lower California with unmarked vertex and uniform light reticulations is rare in Arizona where its place is taken by the dark almost banded variety.

THREE NEW CANADIAN PROPHRYGANEA.* (PHRYGANEIDAE, TRICHOPTERA.)

BY LORUS J. MILNE,

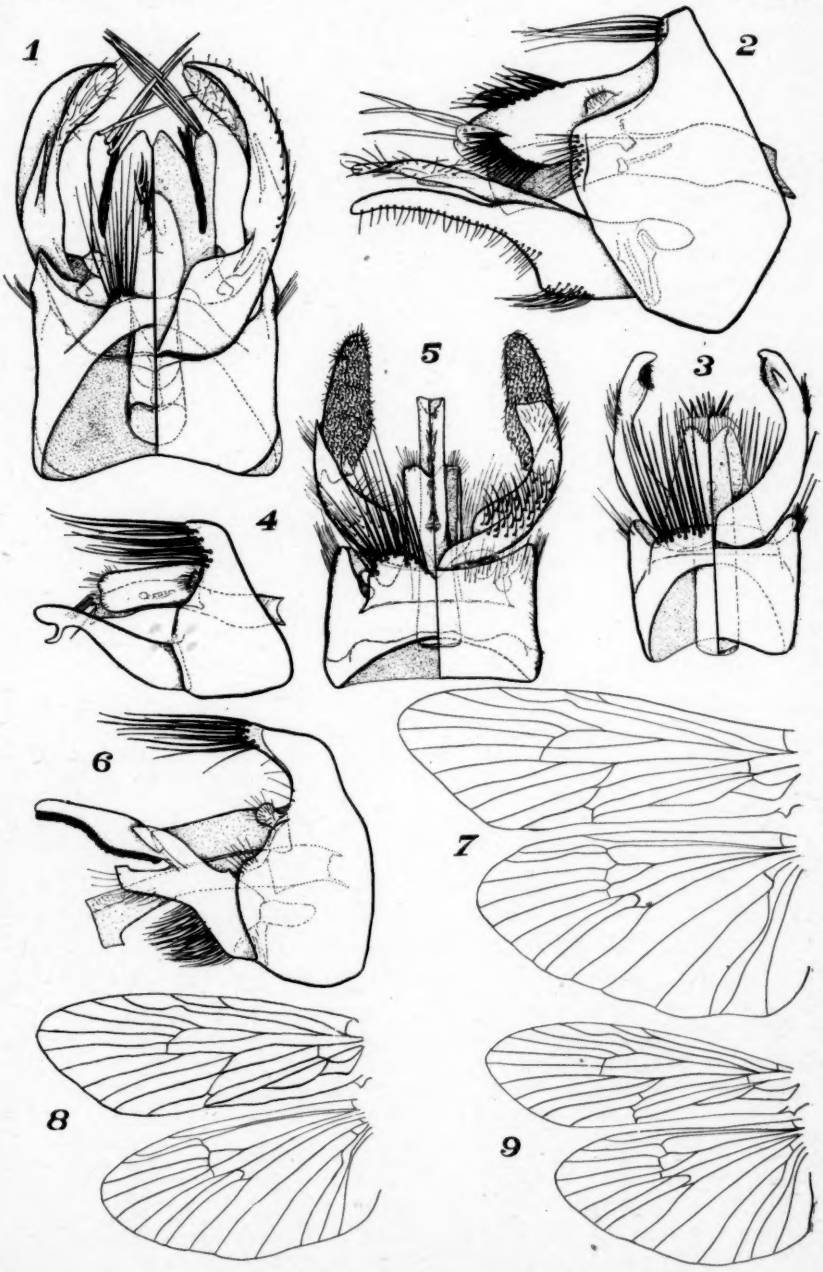
Toronto, Ontario.

During a recent study of the material in the family Phryganeidae in the Canadian National Collection, three nondescript species of the genus *Prophryganea* Martynov have appeared. One of them, viz. *P. deflata* nov., is so close to *P. improba* (Hagen) as to be inseparable on any but the genitalic character illustrated herewith. As the range of *P. deflata* is very much that of *P. improba* (Hagen), it is questionable if the five ♂ co-types of the latter are conspecific; *that one* therefore which was deposited in the Canadian National Collection some years ago by Doctor Nathan Banks, is here designed lectotype, and its genitalia and alar nervation illustrated. This specimen and the genitalic slide are being returned for deposition in the Cambridge Museum of Comparative Zoology.

It also seems advisable to correct the name *Phryganea interrupta* Say, (1828). This is a homonym of *P. interrupta* Fab., (1775). As a synonym on which to base the species is lacking, *P. sayi* n. nom. is here proposed for *P. interrupta* Say.

The illustrations presented were prepared in two ways. Those of genitalia were made with a squared eyepiece in a compound microscope from freshly mounted, unstained specimens, in Canada Balsam. In this way, the form of parts was necessarily exact. Details of attachment and pubescence were applied

*. Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa, Ontario.



NEW CANADIAN PROPHRYGANEA

during study with a dissecting binocular. In places where setae would obscure internal details, they have been omitted in the drawings without comment. In the dorso-ventral views, the left-hand half is dorsum, the right is venter. The genitalia are perfectly symmetrical in this family. In the females, the sac has been omitted as of no taxonomic value. It is uniformly hyaline and rather closely short-pubescent, and attenuately spheroidal along the abdominal axis. The illustrations of venation were drawn from primary types or topotypic paratypes with the aid of a specialized form of *camera lucida,* whereby an enlarged image of the whole wing was projected upon the drawing-card and there traced.

Prophryganea macdunnoughi n. sp.

Male. Palpi and prothoracic legs dark, meso- and metathoracic legs paler, with short appressed greyish pubescence and black spines. Vertex and thorax dark, abdomen cinereous with sparse long yellow hair. Anterior wings reticulate with brown, the splotches of relatively larger area than those in *P. improba* (Hagen). Posterior wings darkened apically with brown, locally reticulate at apex. Expanse 40 mm.

Holotype.— ♂, Nordegg, Alta., June 28, (J. H. McDunnough); No. 3343 in the Canadian National Collection, Ottawa.

Paratype.— ♂, same locality, August 7.

I take great pleasure in naming this species in honour of Dr. J. H. McDunnough.

Prophryganea deflata n. sp.

Male. Of same form and size as *P. improba* (Hagen), the anterior wings often somewhat more coarsely reticulate with brown. Palpi dark, legs paler, pro- and mesothoracic tibiae and all tarsi maculate with darker brown, one sub-basal and one apical ring on each tibia and one apical ring on each tarsal joint. Spines on legs concolorous. Expanse 33-35 mm.

Female. Unassigned, but will undoubtedly turn out to be one of the two species illustrated and described, which I have designated "sp. A." and "sp. B."

Holotype.— ♂, Indian Head, Sask., July 9, (J. DeGryse); No. 3342 in the Canadian National Collection, Ottawa.

Paratypes.—11 ♂, same locality as holotype, July 15, July 30, and from Lethbridge, Alta., July 3, July 23 and July 24, (E. H. Strickland).

Prophryganea bradorata n. sp.

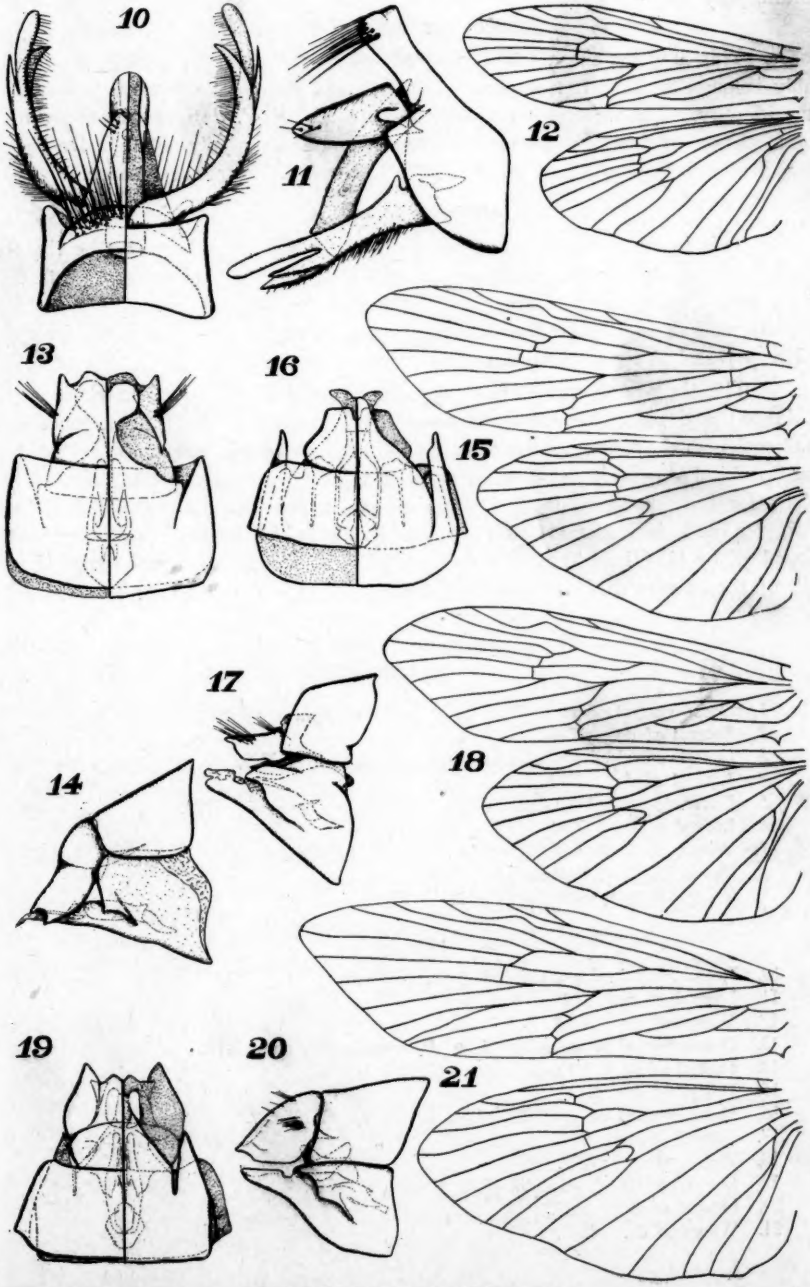
Male. Pale straw-colour, wings and legs immaculate and latter not at all spinose. Antennae and palpi pale brown. The tibial spurs apparently are not constant, and while several specimens have 2-4-4, others in equally good condition have but 0-2-2. The size also varies considerably, but the genitalia are remarkably constant. Expanse 28-34 mm.

Female. Slightly more maculate with brownish reticulation on the anterior wings. A few small spines on the hind tibiae. Expanse 38-40 mm.

Holotype.— ♂, Bradore Bay, Que., July 12. (W. J. Brown); No. 3344 in the Canadian National Collection, Ottawa.

Allotype.— ♀, Aweme, Man., July 12, (R. M. White).

Paratypes.—4 ♂, same data as holotype, Waterton L., Alta., July 21; Saskatoon, Sask., June 30; and Cormorant L., Man., July 14. 9 ♀, same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data as allotype; Lethbridge, Alta., July 20; Indian Head, Sask., July 9, July 13; Saskatoon, Sask., July 18; Cormorant L., Man., July 13; and Aweme, Man., July 13.

Prophryganea sp. A. ♀.

This is either the ♀ of *P. improba* (Hagen) or of *P. deflata,* and probably belongs to the latter species. A pair taken *in coitu* is needed to establish the identity. The description given for the male of *P. deflata* will apply here also. Two specimens examined,—Indian Head, Sask., July 15, (J. DeGryse) and Bradore Bay, Que., August 2, (W. J. Brown) Expanse 40 mm.

Prophryganea sp. B. ♀.

This is likely to be the ♀ of *P. improba* (Hagen) but may be that of *P. inflata.* A fair series, easily separated on the genitalic character illustrated, even when dry, consists of specimens from Lacolle, Que., July 1, (G. H. Hammond), and most of the other localities represented in the series of *P. improba* (Hagen) and *deflata.* Expanse 36-40 mm.

The three new species here described appear to be linked to *P. improba* (Hagen) and somewhat more remotely to *P. vestita* (Walk.) by a seemingly unmentioned character in the venation of the posterior wings, *viz.*—that the mediocubital crossvein is bent in a distinct U towards the wing base. This character is not present in any other species in the Canadian National Collection, but as it is illustrated in *P. varia* (Fab.) (*vide Genera* Insectorum, fasc. 60, pl. 2, by G. Ulmer, 1907) it will probably be found in several more, if not all, of the species in *Prophryganea* Mart.

KEY TO PLATES

Plate 15

Fig. 1. Dorso-ventral of genitalia of ♂ *P. macdunnoughi* n. sp X23.
2. Lateral of do. X23.
3. Dorso-ventral of genitalia of ♂ *P. deflata* n. sp. X29.
4. Lateral of do. X23.
5. Dorso-ventral of genitalia of ♂ *P. improba* (Hagen) X23.
6. Lateral of do. X23.
7. Wings of ♂ *P. macdunnoughi* nov. X9.5.
8. Wings of ♂ *P. deflata* nov. X9.5.
9. Wings of ♂ *P. improba* (Hagen) X9.5.

Plate 16

Fig. 10. Dorso-ventral of genitalia of ♂ *P. bradorata* n. sp. X19.
11. Lateral of do. X19.
12. Wings of do. X12.
13. Dorso-ventral of genitalia of ♀ *P. bradorata* n. sp. X15.
14. Lateral of do. X13.
15. Wings of do. X12.
16. Dorso-ventral of genitalia of ♀ *P. sp.A.* X10.
17. Lateral of do. X10.
18. Wings of do. X12.
19. Dorso-ventral of genitalia of ♀ *P. sp.B.* X13.
20. Lateral of do. X13.
21. Wings of do. X12.

III. NEW COLEOPTERA FROM WESTERN CANADA.*

BY RALPH HOPPING,
Vernon, B. C.

CERAMBICIDAE

During the last few years' collecting in British Columbia, certain new species of Coleoptera have accumulated, until the writer now has a sufficient series of each to warrant their description.

The colour variations in many species are often very misleading. If a species varies from testaceous to black, the black specimens will often appear to be more finely punctured and unless one has a large series with wide geographical distribution, the mistake is often made of describing a colour variation as a new species or subspecies. Also the sexes in this family often present great variation in form, degrees of punctation and colour.

In May, 1930, the author secured a fine series of *Pidonia gnathoides* Lec. The females without exception have a reddish prothorax while the males have a black prothorax. The middle and hind legs are also often black or darker than the females.

Pidonia quadrata n. sp.

Length 6 to 7 mm. Entirely testaceous except antennae, tarsi and one faint black spot on each elytron.

Head short, deeply transversely impressed before the antennae; convex, with well defined median longitudinal line; strongly constricted rather far behind the eyes; finely, moderately punctate. Antennae widely separated, annulate except the scape which is pale. Eyes deeply narrowly emarginate, elongate and narrower posteriorly.

Pronotum as long as wide, with punctation fine and moderate; convex with anterior and basal transverse constrictions strongly impressed; anterior impression straight, basal impression bisinuate with median fovea; lateral margins angulate in front of the middle; a median longitudinal impression on the disc.

Elytra parallel, comparatively short; punctation moderate and coarse becoming finer toward the apex; apices subtruncate; one small dusky spot just behind the middle and toward the lateral margin of each elytron.

Ventral surface finely punctured and tarsi dark. Vestiture fine and sparse except the elytra coarse and semi-decumbent; golden.

The male differs only in its more slender form and the last ventral segment feebly excavated.

Holotype— ♀ Wigwam Inn, Burrard Inlet, B. C., VI-27-29. G. R. Hopping. No. 3262 in the Canadian National Collection, Ottawa.

Allotype— ♂ bearing same label as Holotype, in the Canadian National Collection, Ottawa.

Paratypes— ♂ Lynn Valley, Vancouver, VII-9-30, R. T. Turner. 2, Clayoquot Sound, B. C., G. Spencer, VI-26 and 1 Vancouver, B. C., in the collections of the Univ. of B. C. and the author. This species should be placed in the Swaine and Hopping* key immediately after *P. aurata Horn.*

*The Lepturini of America North of Mexico, Part, I. National Museum of Canada. Bull. 52. 1928. p. 17.

*Contribution from the Division of Forest Insects, Entomological Branch, Department of Agriculture, Ottawa.

In general appearance it resembles a female *P. gnathoides* Lec., but is easily distinguished by the quadrate, deeply impressed pronotum and from its nearest ally, *P. aurata* Horn, by its much shorter form, shorter segments to the antennae, maculation and very much more angulate margins to the pronotum.

Poecilobrium gibsoni n. sp.

Length 5 to 6 mm. A vivid unicolourous blue, with antennae, legs and ventral surface blue black.

Head short, punctation very sparse; labium transversely carinate; antennae widely separated; eyes rather coarsely granulate, narrowed posteriorly. Antennae about ⅔ length of body.

Pronotum convex, not margined and constricted basally; punctation sparse.

Elytra with margins parallel; apices evenly rounded to suture which is obtusely angulate; punctation shallow and sparse.

Ventral surface blue black, very sparsely punctured. Vestiture long, erect, black, and very sparse. Front tibia and tarsi with dense, golden pile underneath.

The sexual differences are very slight, the antennae of the male but slightly longer than the female and the male abdominal segments narrower with sutures more sulcate.

Holotype—♀ Vernon, B. C.; V-31-28. R. Hopping, No. 3261 in the Canadian National Collection.

Allotype—♂ Vernon, B. C.; VI-11-28. R. Hopping; in the Canadian National Collection.

Paratypes—2 ♂♂, 1 ♀—all from Vernon, B. C., collected by Ralph Hopping on May 23, 1929, and May 31, 1928.

The two species may be separated as follows:—

A—Elytral punctures deep and moderately dense. .....*chalybeum* Lec.
AA—Elytral punctures shallow and sparse. .....*gibsoni* Hop.

The eight specimens of *P. chalybeum* before me range from 4 to 5 mm. and are all from the Sierras of Central California. They are a purplish blue, generally with femora testaceous, only one having the legs unicolorous. *P. gibsoni* is a much more vivid shining blue without purple lustre and the five specimens before me much more sparsely punctured than *chalybeum* which is dense in comparison.

Host—*Prunus emarginata.*

Named in appreciation of the many kindnesses shown me by my friend, Mr. Arthur Gibson.

Genus **Asemum** Esch.

I do not think the generic characters given by Col. Casey are sufficient to separate his genus *Liasemum* from that of *Asemum* Esch. The two species *nitidum* Lec., and *mokelumne* Csy., are, however, distinct from the *moestum-atrum* complex to which all the species of Casey under *Asemum* seem to belong.

For instance, in a large series from California or British Columbia all the varieties of costate and non-costate elytra can be found. Also in one series from the same locality can be obtained specimens of different densities of punctation and with prothorax angulate to rounded and even with elytra test-

aceous. In comparing specimens from New York, Eastern Ontario, Western Ontario, Alberta, British Columbia, California, and various states; *atrum* and *moestum* can apparently be found in every series with all kinds of variations. I have therefore been forced to the conclusion that these are all one very variable species which should be all placed under the name *Asemum atrum* Esch.

The arrangement should be as follows:—

1. Asemum atrum *Esch.* 1830.
   - *moestum* Hald. 1847.
   - *obsoletum* Hald. 1847.
   - *brunneum* Hald. 1847.
   - *substriatum* Hald. 1847.
   - *juvencum* Hald. 1847.
   - *fuscum* Hald. 1836.
   - *striatum* Kby. 1837.
   - *gracilicorne* Csy. 1912.
   - *ebenum* Csy. 1912.
   - *curtipenne* Csy. 1912.
   - *amputatum* Csy. 1912.
   - *parvicorne* Csy. 1912.
   - *fulvipenne* Csy. 1912.
   - *costulatum* Csy. 1912.
   - *pugetanum* Csy. 1912.
   - *brevicorne* Csy. 1912.
   - *carolinum* Csy. 1924.
   - *stocktonense* Csy. 1924.
2. Asemum (Liasemum *Csy.*) nitidum *Lec.*
3. Asemum (Liasemum *Csy.*) mokelumne *Csy.*

Col. Casey seems to have done what Haldeman did in 1847. Both authors seem to have been misled by the variation and insufficient material.

Semanotus lignea var. **thujae** Van D.

I have before me a much larger series than Dr. Van Dyke had when he described his subspecies *thujae*, Pan. Pac. Ent. Vol. 3, No. 3. Jan., 1927, all bred from *Thuja plicata* and numbering thirty-six specimens. I have examined many more in various collections including some sent me by Mr. Hardy. I also have a series of thirty-two specimens of *S. lignea* var *ampla* Csy., bred from *Libocedris decurrens*, and have examined many others. Dr. Van Dyke says:—"The most characteristic feature of the variety is that the base of the elytra is black, whereas in all other varieties the base is orange yellow." Of the thirty-six specimens before me bred from *Thuja plicata* twelve have the base orange yellow. These are from Pender Harbour, B. C. Of the thirty-two specimens bred from *Libocedris decurrens* three have the base of the elytra blue black. I have even a further extreme in colouration where the elytra of two British Columbia specimens are blue black without maculation and three specimens from California are testaceous without maculation. Between these forms rangs every form of maculation. I am also unable to find more than the ordinary range in punctation. Dark specimens generally appear more finely punctured than lighter coloured ones. With due apologies to Dr.

Van Dyke, I am unable to come to any other conclusion than that *thujae* and *ampla* are one and the same variety.

SCARABAEIDAE.

Since Mr. H. C. Fall's[1] excellent monograph on the Dichelonyx apparently only three species have been described, *D. mormona* and *testaceipennis* by Mr. Fall[2] in 1907 and *D. oregona* by Van Dyke[3] in 1918. One of Mr. Fall's species, *D. longiclava* is, *teste* Van Dyke,[4] a synonym of *D. pallens* Lec. Of the numerous species only four are not represented in my collection, all belonging to the first group, viz., *pallens, robusta, clypeata* and *picea*. Of the second group, with sulcate pronotum, all are represented, most of them by good series. The following new species have for a long time been awaiting description, and belong to the second group with sulcate prothorax.

Dichelonyx deserta n. sp.

Length 9 to 11 mm. Body black, elytra vivid green, legs, antennae, clypeus and narrow lateral margin of elytra pale. Legs testaceous to brown, often with nebulous brown markings.

Male—head piceous, granulate-punctate; margin of clypeus pale and strongly reflexed; clypeal suture evident and slightly impressed. Pronotum piceous with large areas impunctate and shining; median sulcus well defined but not broad.

Elytra vivid green; punctation dense; vestiture short and moderate, ashy; margins pale.

Legs pale to brown; hind tibiae with outer spur much wider than the inner and evenly rounded at apex to inner margin.

Female—more robust, but except for its larger size does not seem to differ from the males except, of course, in the tibial spurs.

Holotype—Walker Lake, Bloody Canon, Calif. VI-17-1917. (C. L. Fox).

Allotype—same data.

Paratypes—11 ♂ ♂ and 1 ♀, two of these, No. 3264 in the Canadian National Collection, the remainder in that of the author.

Two females and twenty-six males before me collected by the late C. L. Fox who kindly gave me the whole series in 1917.

D. deserta is much nearer *D. sulcata* than any other species. It differs in colour of elytra, density of vestiture, and in the almost absence of vittae which are very evident in *sulcata*. *D. sulcata* has the elytra piceus with faint greenish lustre and longer and denser vestiture over the entire body.

Dichelonyx columbiana n. sp.

Length 10 to 11 mm.. Body black in the male, rufous to black in the female; elytra bronze green with vittae almost obsolete, particularly so in the males.

Male—head with margin of clypeus strongly reflexed; clypeal suture not impressed and barely visible, front granulate, punctate, with vestiture inconspicuous; antennal club moderately long.

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[1]Trans. Amer. Ent. Soc. Vol. XXVII. pp. 277-292, Aug. 1901.
[2]Trans. Amer. Ent. Soc. XXXIII. May. 1907. pp. 248-249.
[3]Bull. Brook. Ent. Soc. XIII. 1918. p. 11.
[4]Pan. Pac. Ent. Vol. IV. No. 4. p. 165. 1928.

Pronotum granulate punctate, black, with only median impunctate area; vestiture moderately short and inconspicuous.

Elytra bronze green with vittae also green and barely visible; vestiture short, sparse and light in colour; punctation moderate.

Legs with femora testaceous, femur and tarsi more or less piceous; tibial spurs of even length, truncate, the outer much wider than the inner.

Female—the female differs by being a little more bronzed, often with body rufous and pronotum brown with rufous pronotal sulcation and margins.

Holotype—♂ Vernon, B. C. V-1-1924. R. Hopping. No. 3263 in the Canadian National Collection.

Allotype—♀ Vernon, B. C. V-2-1924. R. Hopping.

Paratypes—6 ♂♂-5 ♀♀—All from Vernon, May 1 and 2, 1924, in the Canadian National Collection and that of the author.

D. columbiana should come immediately after *D. vicina*, and is probably the same as remarked by Mr. Fall in his monograph, p. 292, "Specimens from Montana (Helena) in the Hubbard and Schwartz collection have a more numerously punctate thorax and are possibly distinct." (from *sulcata*.)

I am indebted to Mr. D. K. Duncan for a very nice series of *D. sulcata* Lec. from Arizona. *D. columbiana* differs in having the pronotum more punctate, the elytra more bronze green, absence of longitudinal lines on each elytron and the sparser vestiture. The females differ in the median rufous line of the pronotum, which in only one specimen out of thirteen is black. The vestiture of the median line is inconspicuous, while *sulcata* has conspicuous ashy vestiture. The females of *columbiana* also average much larger than *sulcata* and are more like *vicina*.

A series of eleven males and thirteen females are before me, all from B. C.

The males of this group, including *valida, vicina, sulcata, columbiana* and *deserta* having "Elytra uniformly green or piceous with distinct greenish or bronze lustre, the lateral margin often narrowly pale," may be separated by the following key:—

A. Outer tibial spur of male much broader than the inner, with tip truncate or rounded to inner margin.
  B. Pronotum with large portions impunctate.
    C. Elytral vittae distinct, elytra brown with faint greenish lustre; vestiture of front of head light in colour, long conspicuous. *sulcata* Lec.
    C. Elytra vittae almost obsolete; elytra vivid green; vestiture of front of head black in colour, short, inconspicuous. .....*deserta* n. sp.
  BB. Pronotum in great part punctate.
    C. Vestiture of head and pronotum coarse, long and conspicuous; punctation and vestiture of elytra dense. .....*vicina* Fall.
    CC. Vestiture of head and pronotum short and inconspicuous; punctation and vestiture not dense, comparatively sparse: *columbiana* n. sp.
AA. Outer tibial spur of the male but little wider than the inner: *valida* Lec.

Most of the species of Dichelonyx are represented in my collection by very large series. In describing the above species it was necessary to check them carefully for errors in determination. It was found that not only is

there a more evident disparity between the tibial spurs of *D. vicina* as distinguished from *D. valida* but that the wide spur is generally distinctly and broadly truncate, the female antennal club very short and wide and fully one-half of the twenty-nine females of *vicina* have the prothorax rufous and one female is entirely rufous including the elytra.

CORIXIDAE FROM THE ENVIRONS OF HUDSON BAY (HEMIP., CORIXIDAE)*

BY G. STUART WALLEY,

Ottawa, Ont.

To Mr F. Johansen I am indebted for a small collection of Corixidae obtained by dissecting the stomach of a 28 centimeter male specimen of the Arctic Grayling (*Thymallus signifer* Richards.) captured in a small tributary near the mouth of the Churchill River, Manitoba. Three species are represented, one of which is described below.

Arctocorixa chanceae Hungfd.—One male. This is a typically northern species, described from Alaska and subsequently (Can. Ent., LXII, 77, 1930) recorded from Canadian Labrador.

Arctocorixa convexa (Fieb.)—One male and one female. This species was described from Nain, Labrador, and has been reported since (*op. cit.*) from Cape Charles, Labrador, and Eastern Quebec.

The majority of the specimens at hand pertain to a new species of *Arctocorixa* for which the following description is presented.

Arctocorixa johanseni n. sp.

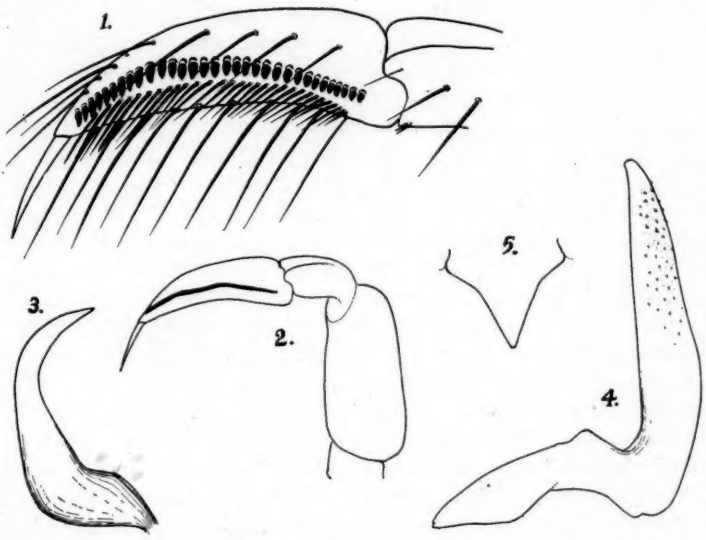
(Figs. 1-5)

Male.—Length 6.4 mm. Rather stout bodied and a little depressed. Head from above slightly produced, shortest inter-ocular space exceeding diameter of an eye. Post-ocular space broad especially toward inner margin of eye, the occipital margin slightly sinuate outwardly thus narrowing the post-ocular space. Front with median depression distinct, broadly oval, upper extremity almost opposite middle of eyes, laterally as broad as distance between eyes. Vertex with an obscure carina, mostly smooth and shining, a few indistinct punctures and slight longitudinal scratches at inner posterior angle of eyes. Maculate area of pronotal disk slightly more than twice as broad as long, weakly but evenly castrate throughout with the narrow dark lines sometimes slightly impressed and a low median longitudinal carina visible on anterior two-thirds of pronotum but most distinct anteriorly. Lateral lobe of prothorax narrow, longer than broad, the apex truncate. Metaxyphus small, distinctly acute at apex. Front femora moderately broad, broadly oval in cross section with the usual stridular area. Tibiae longer than thick with two carinae above, inwardly with two strong setae. Pala slender, four times as long as broad at middle, upper and lower margins curved, the acute apex with a stout spine, the inner face near lower margin with a gradually curved row of 32 closely set pegs which are small and blunt basally but become larger and more acute toward apex. Clavus and corium shining, the former roughened but not rast-

*. Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa, Ontario.

rate, both with sparse pale appressed hairs. Strigil small, broadly oval, five striae.

Vertex and front pale yellowish the former with a slight dusky spot at apex. Legs pale yellowish white, the coxae, base of hind femora, apices of mid and hind tarsi and basal half of abdominal venter blackish. Pronotum with disk pale yellowish narrowly margined with brownish and with 9 narrow



Arctocorixa johanseni n. sp.

1. pala of ♂. 2. front leg of ♂. 3. right ♂ clasper. 4. left ♂ clasper. 5. metaxyphus.

transverse brownish lines which are forked, joined or abbreviated laterally. Clavus and corium with dark and light reticulae in about equal proportions, the pattern continuous over the membrane area and consisting throughout of an interlocking meshwork of brownish, somewhat similar to that of *A. germarii* (Fieb.). Embolium pale, slightly dusky toward apex.

Holotype—♂, Fort Churchill, Man., Oct. 23, 1929, (F. Johansen), No. 3244 in the Canadian National Collection, Ottawa.

Allotype—♀, same data as holotype.

Paratypes—14 ♂♂, 20 ♀♀, same data as holotype; 1 ♂ and 12 ♀♀ paratypes are preserved in alcohol. Paratypes in the Canadian National Collection and in the private collections of Mr. J. R. de la Torre-Bueno and Dr. H. B. Hungerford.

Notes—The females are slightly larger than the males, averaging 7 mm. in length.

Among the paratypes there is some variation in pronotal markings. In some specimens there are only 7 almost regular dark cross bands while in others the number is confused by the forking or fusion of two or more bands.

SOME ERYTHRONEURA (GRAPE LEAF HOPPERS) OF THE MACULATA GROUP. (HOMOPTERA CICADELLIDAE)

BY R. H. BEAMER

Department of Entomlogy, University of Kansas, Lawrence, Kansas.

(continued from page 135)

13. **Erythroneura spinifera** n. sp.

General ground color yellowish white to semihyaline. Color markings orange to red. Vertex with three white spots more or less surrounded with bands of color. Pronotum with almost rectangular median band touching posterior margin and semblance of vitta from each anterior corner toward anterior margin, usual marks behind each eye. Scutellum with spot at tip, basal angles yellow more or less bordered with red or orange. Clavi with usual anchor spot in base and elongated spot just before apex, Coria with spot on costa midway between humeral angle and costal plaque, another more or less connected angulate vitta arising at anterior end of costal plaque, enlarging midway and ending just before base of cell M_4 and smaller one at posterior end of costal plaque. Cross-veins tinged with color. Tips of tegmen more or less dusky. Small black spot in the posterior margin of costal plaque and larger one in base of cell M_4. Venter stramineous, more or less tinged with pink.

Genitalia. Pygofer hook rather short and slender with very slight S curve, some teeth on inner margin. Style with medium foot; base curved; heel medium; anterior point short, stout, less than a right angle, projecting anteriorly; posterior point larger, much sharper, about as long as toe is wide, hooked inward. Oedagus short, larger just before tip, covered with spines on outer third, curved slightly in lateral view, almost straight in ventral view.

Holotype; male, Leavenworth Co., Kans., April 28, 1928, R. H. Beamer.

Allotype; female, Gallatin Co., Ill., March 31, 1929 and 10 male and 2 female paratypes from Kansas and Illinois.

14. **Erythroneura triangulata** n. sp.

General ground color yellowish white to semihyaline. Color markings red to orange. Vertex with three white spots surrounded by bands of color. Pronotum with median triangular spot anterior angles of which are often extended, this spot usually narrow, usual angular spots back of each eye. Scutellum with spot on tip, basal angles yellow bordered on outer margin with red. Clavi with usual basal anchor spot and small spot just before tip. Coria with spot on costal margin midway between costal plaque and humeral angle, another at anterior end of costal plaque, large spot between claval suture and Cu, beyond this all longitudinal veins red, red on Cu enlarged just before base of cell M_4. Cross-veins red. Tips of tegmen more or less dusky. Small spot in posterior margin of costal plaque and one in base of cell M_4. Venter stramineous more or less tinged with red or pink.

Genitalia. Pygofer hook single with a very slight S curve, of medium length and rather heavy, with median row of short teeth. Style with short foot; base curved; heel large; anterior point short, less than right angle, projecting out; posterior point as long as foot, triangular in shape, as wide at base as half length of foot. Oedagus short, heavy, heart-shaped, thickly covered with spines.

Holotype; male, Gallatin Co., Ill., March 31, 1929, P. W. Oman.

Paratypes; 12 ♂, Johnson Co., Ill., March 31, 1929, R. H. Beamer, and one male each from Bowie Co. Texas, Natchitoches Parish La., R. H. Beamer and Polk Co., Ark., R. H. Beamer.

15. **Erythroneura bispinosa** n. sp.

General ground color yellowish white to semi-hyaline. Markings orange. Vertex with a median oblong orange circle connected to the eyes by narrow orange stripe in some specimens. Pronotum with median, usually very narrow, triangular spot, not touching either margin but prolonged somewhat at the anterior corners. Customary red dash behind each eye. Scutellum with orange spot on tip; basal angles yellow. Tegmina marked as follows; clavi with basal anchor-shaped spot, not sharp but usually quite narrow, and another spot just before the tip; coria with small spot at humeral angle, one starting in costal margin near anterior end of costal plaque and angling toward outer spot on clavi but not reaching claval suture, and third stripe arising at outer end of costal plaque and crossing almost to base of cell M_4. Cross-veins orange. A small black spot in outer end of costal plaque and in base of cell M_4. Venter stramineous often with some pink markings.

Genitalia. Pygofer short and rather broad, widening posteriorly to tip where it ends in two short, sharply diverging spines. Style with medium foot; heel medium; base of foot almost straight; anterior point about a right angle; posterior point almost as long as foot is wide, sharp and narrow. Oedagus of medium length almost straight from any view, not distinctive.

Holotype; male, Anderson Co., Kans., Sept., 9, 1927, R. H. Beamer.

Paratypes; males, from Plummer's Island Md. W. L. McAtee, Cherokee Co., Cloud Co., and Anderson Co., Kansas, Johnson Co., Ill., Bowie Co., Tex., and Nashville, Tenn.

The pygofer hook separates this species from all others.

16. **Erythroneura calamitosa** n. sp.

General ground color whitish to semi-hyaline. Marked with orange. Vertex with a median thick-walled oval, orange ring, touching base, and connected to each eye by a curved orange line, giving the appearance of a white basal spot near each eye. Pronotum with a median usually broad, sometimes almost rectangular, orange spot with usual dashes back of each eye. Scutellum with orange spot at tip and basal angles yellow. Clavi with orange anchor in base not large but well marked, and another spot just before tip. Coria with diagonal stripe arising at anterior end of costal plaque, angling toward outer spot on clavus but not reaching claval suture. Semblance of another stripe arising at posterior end of costal plaque and proceeding toward base of cell M_4. Cross-veins orange. Tip of tegmen more or less tinged with brown. Black spot in anterior end of costal plaque and larger one in base of cell M_4. Venter stramineous, often tinged with pink.

Genitalia. Pygofer hook very long, single, narrower a short distance from base than at almost any other point, strongly incurved then straightening out almost to tip where it curves out again. Style with medium foot; heel large; base curved; toe very small; anterior point short and sharp; no posterior point. Oedagus long, broad from any view, with teeth about the tip.

Holotype; male, Anderson Co., Kans., Nov. 27, 1927, R. H. Beamer.

Paratypes; 14 males from Illinois, Kansas, Arkansas and Tennessee.

Distinguished from *E. parvipes* by the broader and longer Oedagus and by the longer pygofer hook whose outer concavity is more nearly flat at its bottom.

17. **Erythroneura uncinata** n. sp.

General ground color pearly white on vertex to almost hyaline on tegmen. Color markings orange to red. Vertex with semblance of three white spots surrounded with medium bands of color. Pronotum with median rectangular spot, touching posterior margin, and usual spots back of each eye. Scutellum with spot on tip, basal angles yellow usually bordered with red, at least on outer margin. Clavi with basal anchor, usually quite narrow, and spot before tip. Coria with spot on costal margin midway between humeral angle and costal plaque, another at anterior end of costal plaque, one opposite open space in clavi, two smaller ones near posterior end of costal plaque and larger one near base of cell M_4. Cross-veins red or orange. Small black spot in base of cell M_4. Tips of tegmen more or less dusky. Venter stramineous more or less tinged with pink.

Genitalia. Pygofer hook single, with slight S-curve, thickened toward middle. More or less toothed on inner side, barely longer than pygofer. Style with medium foot; base curved; heel large; anterior point short slightly less than right angle; posterior point two-thirds as long as foot, sides almost parallel, slightly incurved. Oedagus short and stout, widest at base, in lateral view slightly curved dorsally, spiny on dorsal side, ending in dorsally projecting lip.

Holotype; male, Leavenworth Co., Kans., April 4, 1928, R. H. Beamer.

Paratypes; 7 ♂, Kansas and Illinois.

18. **Erythroneura parvipes** n. sp.

General ground color whitish to semi-hyaline. Marked with orange. Vertex with median, thick-walled, oval orange ring, sometimes broken in two places anteriorly, touching base and connected to each eye by a curved orange line giving the appearance of a white basal spot near each eye. Pronotum with median orange triangle, upper corners of which sometimes reach anterior margin but usually not the base and two orange spots back of each eye. Scutellum with tip orange, basal angles yellow usually margined on two sides at least with orange. Clavi with definite orange anchor in base and orange spot before tip. Coria with a small humeral mark, a red stripe, irregular in outline, arising on costal margin, surrounding costal plaque and angling toward base of cell M_4. It differs in this from *E. calamitosa* which has the two stripes either end of costal plaque disconnected. Cross-veins mostly orange. Usual small black spot in outer end of costal plaque and larger one in base of cell M_4. Tips of tegmen more or less dusky. Venter stramineous tinged with pink in places.

Genitalia. Pygofer hook long but shorter than in *calamitosa,* strongly curved in but the apex of concavity is rounded throughout. Styles with almost perfect foot; heel large; toe very slim; base of foot curved; anterior point sharp, short; no posterior point. Oedagus short, rather slender, straight.

Holotype; male, Anderson Co., Kansas, November 26, 1927, R. H. Beamer.

Paratypes; 6 ♂, from Kansas and two from Nashville, Tenn.

19. **Erythroneura turgida** n. sp.

General color yellowish white to semihyaline. Color markings red or orange. Vertex with red spot at apex, four longitudinal red lines from base to anterior margin of eyes, sometimes a basal cross-line, in some specimens a cross-line between the anterior end of eyes as well as connection of two median lines with anterior apical spot. Pronotum with median semi-rectangular spot usually not connected with either margin and usual angular mark behind each eye. Scutellum with red or orange tip, basal angles yellow more or less surrounded with orange. Clavi with usual anchor mark at base and rectangular mark before tip. Coria with small humeral mark, another more or less broken angular mark arising at anterior end of costal plaque, surrounding it, angling and widening to cross-veins near base of cell M_4. Cross-veins red. Tip of tegmen more or less smoky. A black spot in posterior end of costal plaque, larger one in base of cell M_4. Venter stramineous. Legs tinged with pink. Face with a angulate red cross-band.

Genitalia. Pygofer hook long, single, curved in near middle, thickened on apex of this curve to twice normal width then tapering evenly to sharp point at tip. Style with foot of medium length; base curved; heel large; toe narrow; anterior point short, sharp, extending slightly out; posterior point longer, sharp, about half as long as toe is wide. Oedagus slightly longer than foot, almost parallel sided, slightly curved in lateral view.

Holotype; male, Anderson Co., Kans., November 26, 1927. R. H. Beamer.

Paratypes; males from Anderson Co., Kans., 3; Cherokee Co., Kans., 3; Douglas Co., Kans., 1; Leavenworth Co., Kans., 1; Johnson Co., Ill., 2.

20. **Erythroneura parallela** McA.

Erythroneura maculata var. *parallela* McAtee, W.L. Fla. Ent. Vol. VIII, Nos. 3 and 4, p, 38, Dec. 1924.

The following is the original description; "Bears the same relation to *maculata* that var. *rubra* Gillette does to *comes,* the red markings being more extensive and denser than in the typical variety, of a darker shade of red, and the dorsum of abdomen very dark. Length: 2.5 mm.

Holotype male, Lexington, Mass., Sept. 28, 1920; paratype male, same locality, Sept. 18, 1920, and Arlington, Mass., Oct. 9, 1920. Specimens intermediate between this and the typical variety were collected at Lexington at approximate dates."

General ground color yellowish white to semihyaline. Markings orange, almost covering entire surface. Vertex with three yellowish white spots, two circular ones near each eye and an oblong median one, all surrounded by orange bands. Pronotum with V-shaped median spot connecting anterior and posterior margins, usual angular spot back of each eye. Scutellum with orange tip, basal angles yellow bordered by broad orange bands on two sides. Clavi with usual basal anchor occupying almost all of basal half, almost all remainder occupied by a rectangular blotch. Coria orange except a spot opposite anchor on clavi, costal plaque, spot opposite middle of outer blotch of clavi and some irregular blotches between costal plaque and cross-veins. Small black spot in posterior end of costal plaque and base of cell M_4. Tips of tegmen more or less smoky.

Genitalia. Pygofer hook single, of medium length, tapering from base to tip, slightly incurved. Style with medium foot, base curved; heel large; toe narrow; anterior point short about a right angle; posterior point as long as foot, narrow, almost parallel-sided, about a right angle with foot. Oedagus of medium length, forming almost a perfect oval, covered with numerous short spines and ridges, very thin in ventral view.

(to be continued)

BOOK REVIEW

The Butterfly Book, New and Thoroughly Revised Edition, by W. J. Holland: xii and 424 pp. with 73 colored plates, 4 plain ones and numerous text figures giving representation of over 2000 North American Butterflies. Doubleday, Doran & Co., Garden City, N. Y. Price $10.00.

After thirty-three years Dr. W. J. Holland has celebrated his eighty-second birthday by the issuing of a revised edition of this well-known entomological picture book. While the general arrangement and get-up of this new edition remain essentially the same as in the old one, a praise-worthy feature is the removal of all the plates to the back of the book, whereby any individual plate may be much more readily consulted. The twenty-five additional plates, four of which are uncolored, illustrate either species omitted from the old edition or species and varieties described since its publication, the individuals figured often representing the types or part of the type material on which the names were based. The execution of a few of these new plates (notably Plate 72) is somewhat faulty but on the whole they form to the systematic student the most valuable portion of the work.

The main text of the book has been to a considerable extent rewritten and numerous comments on nomenclature and criticism of recent systematic studies are interpolated in the author's usual rather dogmatic manner. In his use of generic names Dr. Holland is very conservative; his ideas on the subject of nomenclature and in particular on the vexed and vexing problem of genotypes has been ably expressed in several recent papers in the Annals of the Carnegie Museum (Vol. XIX, No. 3; XX, Nos. 1, 2). To those interested in this subject we would recommend a careful perusal of these papers as they offer much food for thought and counteract to a certain extent a growing tendency on the part of some workers to credit our early entomologists with ideas along this line which they never possessed and further to observe the letter rather than the spirit of the rules of the International Committee on Nomenclature.

In his treatment of species the author has undoubtedly laid himself open to considerable adverse criticism. Dr. Holland is evidently one of the last survivors of the old school of lepidopterists of which Behr, Strecker and the two Edwards were noted examples; to them any slight variation of color or pattern constituted specific distinctness; they paid little attention to geographical races and were inclined to dismiss the value of genitalic studies with a few rather contemptuous words. Evidences of a similar attitude crop up all through the present book; a comparison of Holland's treatment of the species of the genus *Lycaena* (in a broad sense) with the list of species as

found either in the Barnes and McDunnough 1917 Check List or the Barnes and Benjamin List of 1926 will amply serve to illustrate the first point; a perusal of pages 201 and 355 clearly give us Dr. Holland's views on the subject of genitalic structure. There is further a distinct tendency throughout to belittle the often very careful and conscientious work of recent authors and a preference on the part of the author to base his determinations on specimens ticketed by some of the above-mentioned older authors rather than to follow later, more accurate revision; as a case in point the determination of *Melitaea nubigena* Behr (p. 121) may be cited.

In the larger genera (*Argynnis, Melitaea, Lycaena,* etc.) the species are broken up into groups; these groups are based on most superficial characters of color and pattern and frequently separate species with distinct affinities. Why for instance *Argynnis cybele* and *A. leto* or again *Colias christina* and *C. emilia* and *edwardsi* should be relegated to different groups is a matter known only to Dr. Holland and he probably will not tell us. Among other nomenclatorial vagaries might be noted the citation of *Argynnis luski* B. & McD., rightly described as a race of *eurynome* from the White Mts. Arizona, to *irene* Bdv., a species from the higher altitudes of the Sierra Nevadas of northern and central California, the only point in common between the two being the unsilvered spotting of the underside; *Euphydryas montana* McD., a high altitude race of *E. hutchinsi* is associated with *brucei* Edw., one of the *anicia* subspecies; *Argynnis juba* Bdv., a species from the foothills of the Sierras, California is made synonymous with *coronis* Edw. (so-called) from the vicinity of San Francisco Bay. Of course such differences of type locality mean nothing to our worthy author who believes (*vide* p. 121) that the high mountains of California and Colorado should harbor identical species. Such treatment neither enhances the value of the volume nor increases the reputation of the author as a systematist.

A further innovation in this new edition is the citation of most of the figures of W. H. Edwards' species as being those of type specimens. It is a well known fact, and one which the reviewer has proved by personal examination, that at the time of description Edwards, in very many instances, neglected to label his types as such; at a later date this omission was frequently rectified by writing "type" in red ink across the determination label, but, sad to relate, the specimen so treated was as often as not one that had been acquired subsequent to the description and therefore merely "typical" in Edwards' opinion. If Dr. Holland had seen fit to give us the full data from the labels of these so-called types which he figures it would have been an easy matter to check up on them from the original descriptions; he has, however, very unfortunately neglected to do so and in consequence an element of doubt remains which cannot be eliminated until the figured specimens are critically examined.

In the preface to the present edition the author claims to have the entire literature at his command. This is a pretty sweeping statement and one that we fear, with all due deference to Dr. Holland's wisdom, is not to be proven by the text. To instance certain lapses it might be mentioned that the early stages of *Colias interior,* stated to be little known, were quite fully described in the Canadian Entomologist, XXIX, 249, 1897, and those of *Phyciodes*

batesi, stated as unknown, in the same publication, LII, 56, 1920; also that in Papilio, III, 43, Morrison corrects erroneous type locality designations of several of Edwards' species, notably *Pseudocopaeodes eunus* and *Polites siris.*

In spite of its obvious defects the revised Butterfly Book is a notable addition to our lepidopterous literature and will doubtless continue to be one of the best sellers and a source of delight to the amateur entomologist.

J. McDUNNOUGH.

ANNUAL MEETING ENTOMOLOGICAL SOCIETY OF ONTARIO

The Sixty-eighth Annual Meeting of the Entomological Society of Ontario will be held at the Ontario Agricultural College, Guelph, on Thursday and Friday, November 19th and 20th, 1931.

If the programme is sufficiently full to warrant it, the meeting will be continued on Saturday, November 21st.

Please make a special effort to come and aid in keeping up the interest and high standard of our meetings by presenting a paper and taking part in the discussion.

Titles of papers should be in the hands of the Secretary by November 1st. Please advise time required for reading and whether lantern is needed.

J. D. DETWILER, PRESIDENT
University of Western Ontario
LONDON

R. H. OZBURN, SECRETARY
O. A. College
GUELPH

MAILED SATURDAY, OCTOBER 31ST., 1931